

Estimating the value of electricity reliability: Evidence from California's Public Safety Power Shutoffs

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We ask two main research questions

- ① What are the economic impacts of electricity outages?
- ② What are households and firms willing to pay to avoid future outages?

→ (2) gives us insight into (1) via **“revealed preferences”**

Why do we need to know the VoLL?

Ideally, policy equates the economic benefits of avoided outages to the economic costs of making the grid more reliable

This is relevant to many decisions:

- Right level of “grid hardening” investments
- Right level of resource adequacy in a system with intermittent renewables
- Costly outages vs. needed fire safety

How do you estimate the VoLL?

Historically, estimates have come from:

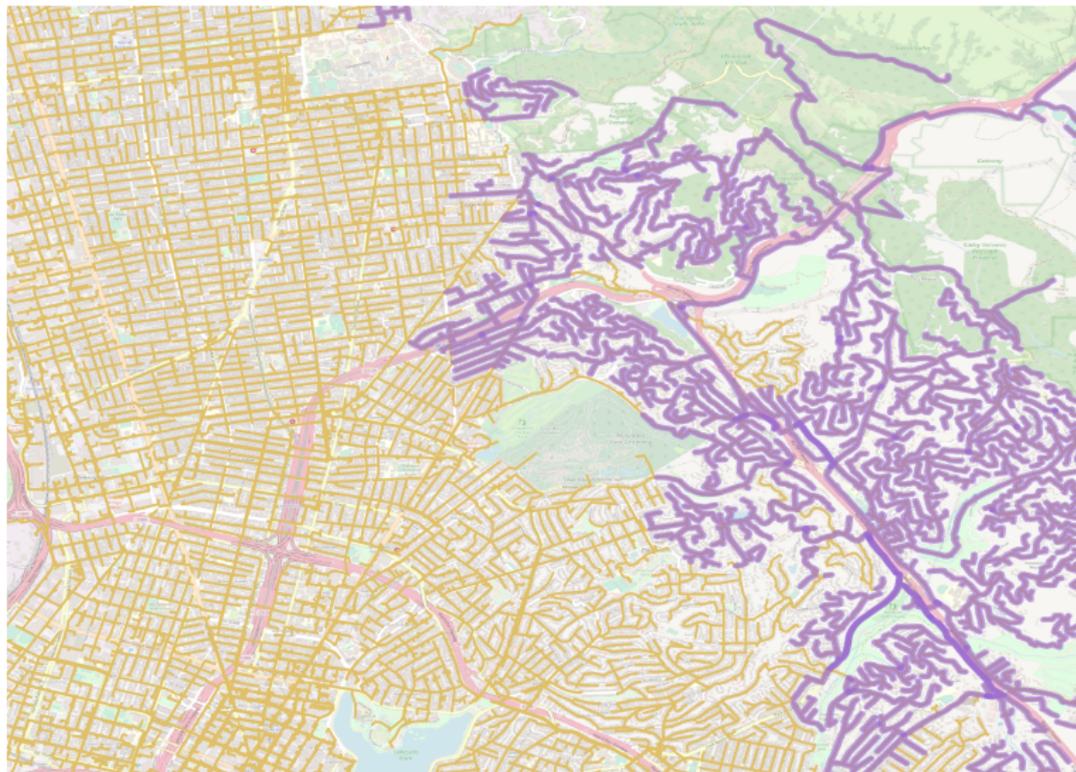
- “Stated preference” surveys: Pose hypothetical scenarios
- “Revealed preference” surveys: Ask what people did during outages
- Macroeconomic calculations

We will use archival data on revealed preferences:

- Based on real decisions
- More representative & reliable than surveys
- Careful attention to **causal** impact of outages
- Perform survey to provide color to data work

Research design: compare PSPS households to neighbors

Feeder maps; purple experienced PSPS.



Adaptation behaviors:

- Generators registered with AQMDS
- Solar & storage interconnections from utilities

Other economic costs:

- Mobility data and firm visits
- Small business failures
- Hospitalizations and medical expenditures

To inform this work, we conducted a survey



We collected survey data on:

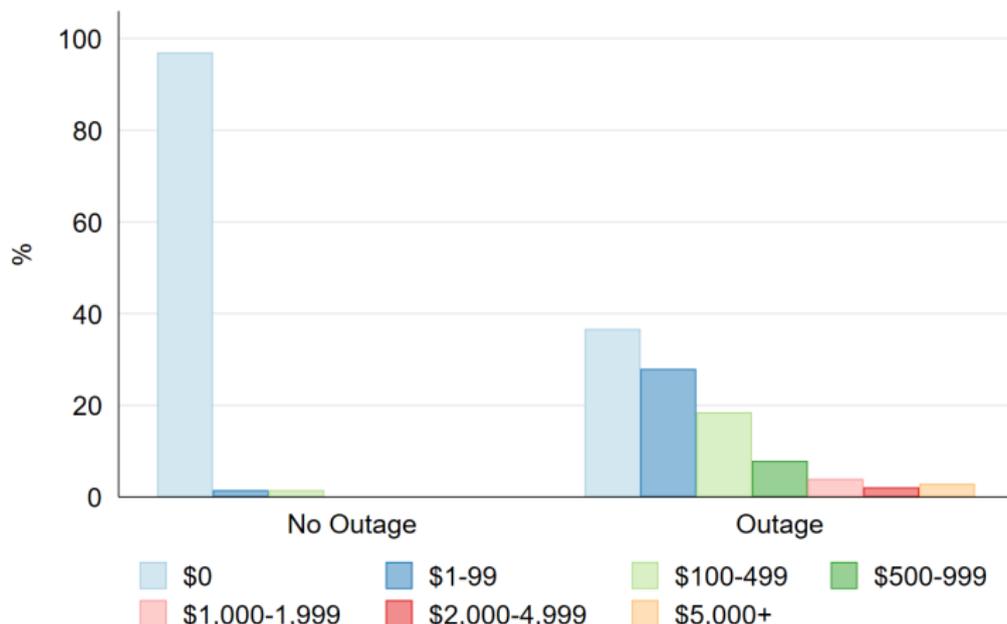
- Household demographics
- Outage exposure
- Outage costs and avoidance behavior
- Expected outages in the future

Representative quotes suggest outages did impose costs

- "could not use CPAP machine"
- "spent \$400 on a hotel room so she could use her CPAP machine, and supply heat and water to herself"
- "needed medical supplies to be refrigerated", "lost a vile of insulin as a result of the outages"
- "lost hundreds of dollars of condiments and meat", "ate out more"
- "lost power to electronic gym devices"
- "kids sent home from school, had to take the day off of work to provide child care"

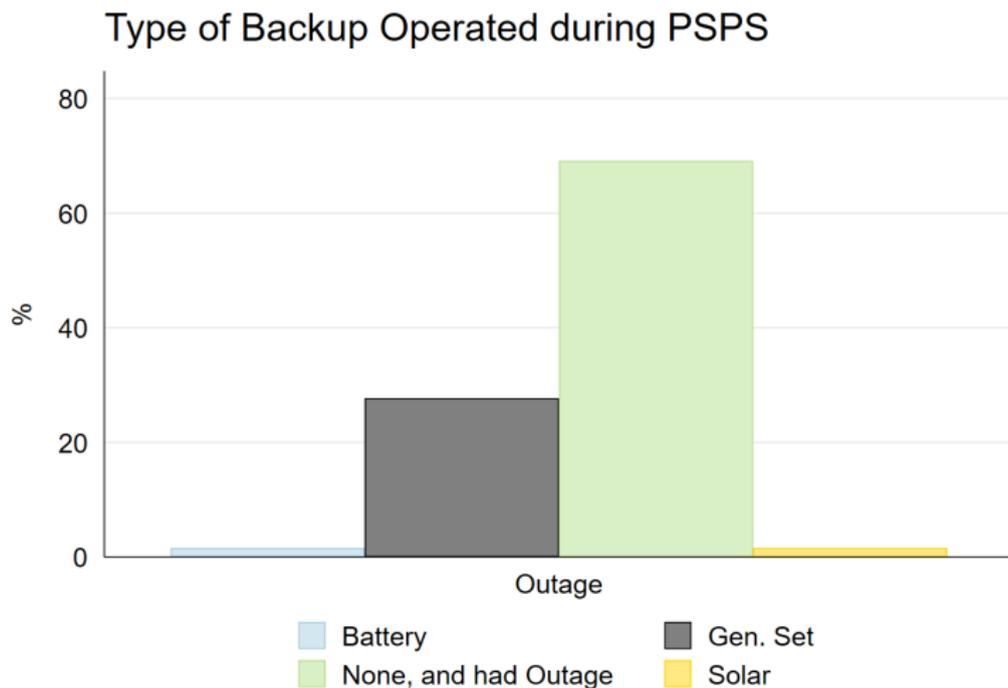
30% of households w/ outages reported costs \geq \$100

Reported Total Cost



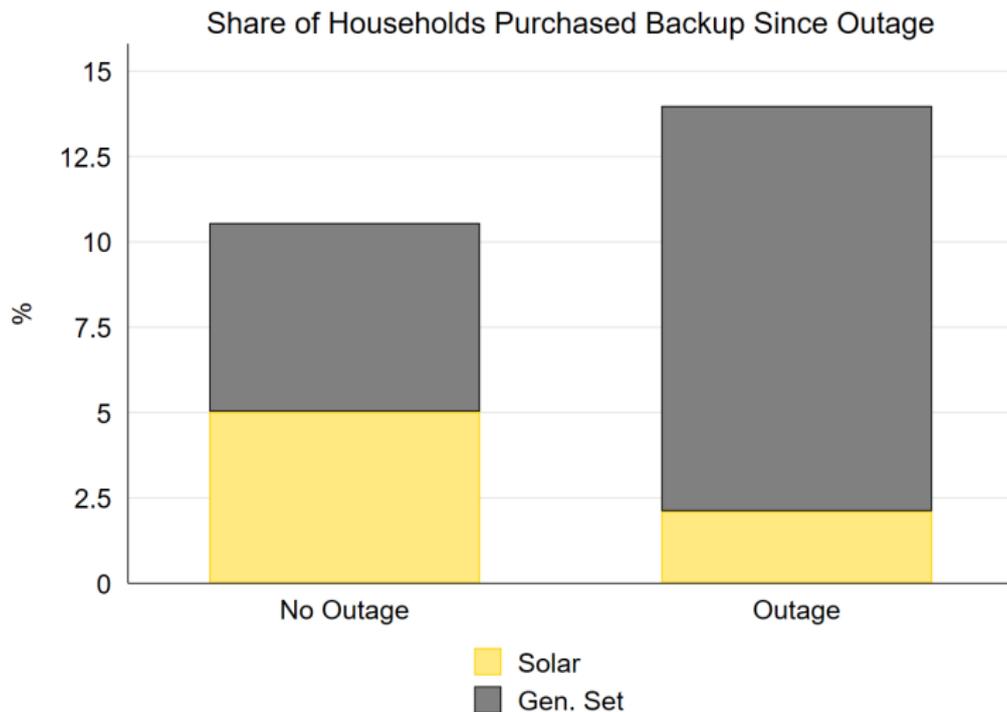
N = 578

Almost 30% with outages already had a generator

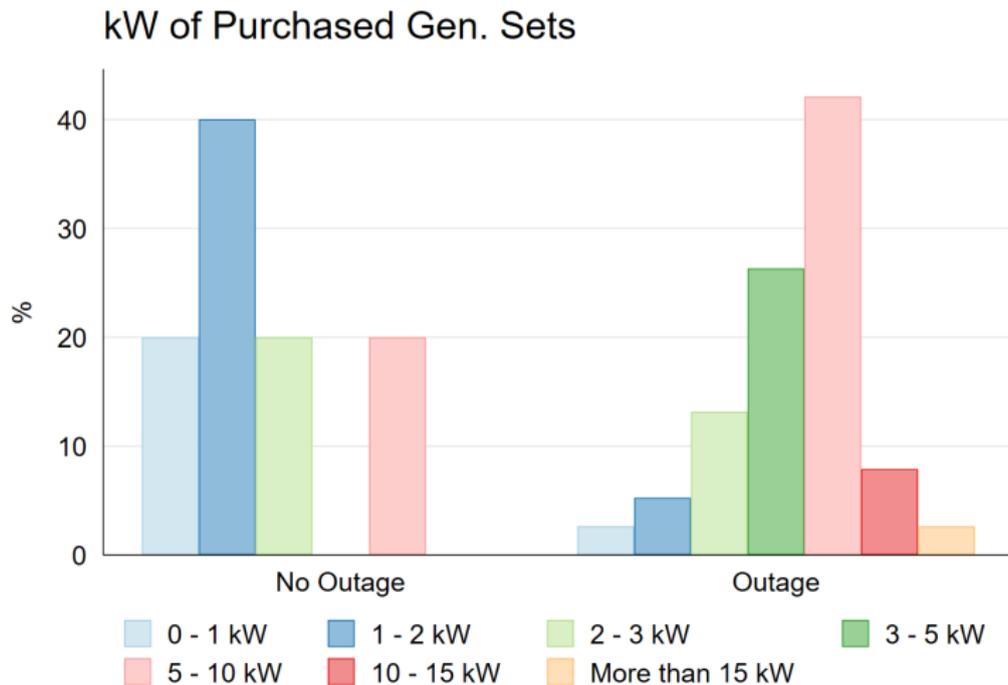


N = 379

2X as many generators purchased, half as much solar



Purchased generators are relatively large



N = 43

Insights from survey

Methodological:

- Utility published outage maps are not very accurate
- Really hard to get decent response rate (ours 5%)

Suggestive results:

- Many people may own generators already
- Generator purchases may crowd-out solar adoption
- Neighbors may respond to threats of outages, even if they didn't experience them
- People may over-size generators, but acquire them inexpensively

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Thank you!

Questions? Comments?

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